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STANDARD FORM NO. 64

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Office Memorandum • UNITED STATES GOVERNMENT

TO : Merril Eisenbud, Director, Health and Safety Division
FROM : Hanson Elatz, Chief, Radiation Branch, Health and Safety Div.
SUBJECT: VISIT TO THE UNIVERSITY OF CALIFORNIA RADIATION LABORATORY MAY 23, 1950
REFER TO
SYMBOL: HSR:HB

DATE: June 2, 1950

The purpose of the visit was to investigate methods used at this installation to protect personnel particularly against the high energy radiations from the various particle accelerators at the University. This work at the Radiation Laboratory is divided into two classifications. Dr. Nelson B. Garden is in charge of health chemistry which embraces contamination and decontamination problems, waste disposal and the transportation of radioactive materials.

The policy of the laboratory differs essentially from most other laboratories working with radioactive materials in that every effort is made to keep the materials completely enclosed and shielded at all times. This means that no open hoods are used for radioactive work. Berkeley dry boxes are used together with various manipulators, dry box gloves and mirror cylinders (consisting of rotatory lead cylinder in which mirrors are so placed to give periscopic view of the contents inside a cave). After equipment being used inside of a dry box or cave has been used, it is transferred by remote handling means to a decontamination chamber where it is sprayed and scrubbed until decontaminated adequately for manual handling. Such spraying and scrubbing is done by means of remote handling devices. The drainage from this chamber is all collected and mixed with concrete for disposal at sea. No liquid material is permitted to enter the drainage system. A large sump originally intended for liquid waste collection is held in reserve for emergency use only. Unique storage and handling facilities for radioactive materials after receipt consists of a room in which holes in the floor admit special material containers which in turn are moved by means of a crane equipped with automatic handling tongs.

A pneumatic tube device has been constructed to permit automatic transfer of cyclotron targets from the cyclotron to the chemistry department in a matter of seconds so that work on shortlived isotopes may be started immediately.

For the convenience of visitors, the University staff has prepared mimeographed sheets of all suppliers of special equipment and material used by the Health Chemistry Department.

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- 2 -

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The second phase of personnel protection under the direction of Dr. Burt J. Moyer is termed Health Physics. This work deals exclusively with shielding and personnel monitoring problems. Each worker wears a film badge, one pocket ionization chamber and one pocket dosimeter for the detection of both beta and gamma radiation. For thermal and low energy neutrons a boron-lined pocket chamber is used. The control of neutron radiation is done principally by means of various survey instruments. For thermal and low energy neutrons Argon-BF₃ chambers with an amplifying device capable of measuring 10⁻¹² amperes is used and is calibrated by means of indium foils. For neutrons in the range of 0.3⁻²⁰ Mev. proportional hydrogenous lined proportional counters are used for surveying. The lining in this case is polyethelene although it was conceded that glycerol tristerate used by ORNL is probably better. Calibration of these instruments is done by calculation and exposures are measured in terms of Mev per square centimeter. There is no personnel monitoring device used in either this or the higher ranges except that the pocket chambers probably detect thermal neutrons that have been moderated by the body.

For neutrons in excess of 50 Mev energy a bismuth fission chamber is employed. Between 20 and 50 Mev no satisfactory method of surveying has yet been found.

The 60" and the 184" cyclotrons as well as the linear accelerator were inspected with particular attention to the warnings, interlocks and shielding. It was reported that in spite of the system of warnings there have been occasions where persons have been locked within the cyclotron prior to its operation. For this purpose remote cut-off switches are located at various points within the cyclotron enclosure for the emergency cut off of the voltage in case someone is located inside.